UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF
PREVENTION, PESTICIDES
AND TOXIC SUBSTANCES

September 28, 2007

MEMORANDUM

SUBJECT: Review of "*Determination of Removal Efficiency of Permethrin (PER) and Piperonyl Butoxide (PBO) from Hand Surfaces Using DSS and Isopropyl Alcohol Dressing Sponges*"

FROM: Jeff Evans, Biologist
Health Effects Division (HED)/Chemistry and Exposure Branch (7509P)

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TO: **Cathryn O'Connell**
Special Review and Reregistration Division (7508P)

DP Barcode: 336771
PC Codes: Permethrin (109701), PBO (067501)
MRID: 46188630

Attached is a review of MRID 46188630 "*Determination of Removal Efficiency of Permethrin (PER) and Piperonyl Butoxide (PBO) from Hand Surfaces Using DSS and Isopropyl Alcohol Dressing Sponges*" submitted by the Non-Dietary Exposure Task Force (NDETF).

The primary review for this study was conducted by Versar and is included as Attachment (1). A secondary review was conducted by the Health Effects Division (HED).

The purpose of the study was to 1) determine residue concentrations of permethrin (PER) and piperonyl butoxide (PBO) on bare hands after they were spiked with known amounts of PER and PBO and 2) to determine the amount removed when wiped with surgical sponges wetted with an artificial saliva substance. The data are meant to be used as saliva removal efficiency inputs to HED's non-dietary ingestion algorithm for assessing exposure via hand-to-mouth behavior of young children.

The study was conducted at the Toxcon Health Sciences Research Centre in Edmonton, Alberta, Canada. The analytical procedures were performed at EN-CAS Analytical Laboratories in Winston-Salem, NC. A formulation of PER (0.78% wt/wt) and PBO 0.76 wt/wt) was developed by NDETF member McLaughlin Gormley King (MGK) for use the hand spiking trial. The formulation was developed to simulate pesticide concentrations that may result from hand contact with post application residues after the use of a total release fogger product containing 0.783% PER and 0.760% PBO.

Five subjects were recruited for the trial agreeing to have both hands (palms) spiked with (on separate occasions) 3 fortification levels of PER and PBO. Prior to spiking, the subjects washed their hands with Ivory soap, followed by a tap water rinse and drying with paper towels. The concentrations applied were 1.88 µg, 17.6 µg, and 53 µg PBO in 25 or 35 µl of isopropyl alcohol (IPA). Likewise for PER, the subject's hands were spike with 2 µg, 20 µg, and 60 µg concentrations in 25 or 35 µl of IPA. The subjects received increasing concentrations of the pesticide spikes every other day. The residues remaining on the hands following the spiking procedure were collected via dressing sponges moistened with dioctyl sodium sulfosuccinate (DSS) and then with IPA moistened dressing sponges as described in Geno et al., 1996. The dressing sponges were extracted and analyzed for PER by using a gas chromatograph equipped with and electron capture detector (GC/ECD) and for PBO by using a high performance liquid chromatography system with a fluorescence detection system (HPLC/FD). The removal efficiency (percent) of artificial saliva (DSS) and IPA at the various spiking concentrations are presented in the following table. The residues collected by the dressing sponges were not adjusted for field or laboratory recoveries since the recoveries were greater than 90%.

Fortification (spike) level (µg)		**Percent Removed**			
		DSS		**IPA**	
PER	**PBO**	**PER**	**PBO**	**PER**	**PBO**
2.26	1.88	40	41	57	42
22	17.6	37	37	50	47
63.1	53.2	37	37	57	50

As presented in the table above, sequential wipes with both DSS and IPA removed the majority of residues from the subjects' hands, with IPA showing a higher degree of removal. These data may be considered for use to refine current Agency point estimates using the DSS (artificial saliva) values. The use of all of the data may be considered for

use in probabilistic assessments following additional statistical analysis and evaluation by HED's Residential Standard Operation Procedures Revision Teams.

The specific limitations of this study identified in the primary review performed by Versar are not significant since those issues such as not providing a label are adequately justified or described in other reports submitted by the task force.

Reference:

Geno P.W., Camann D.E., Harding H.J., Villaboss K., Lewis R.G., (1996) Handwipe Sampling and Analysis Procedure for the Measurement of Dermal Contact with Pesticides. Arch Environ. Contam. Toxicol. 30: 132-138.

Attachment: Primary Review (Versar)

MRID 46188630 "*Determination of Removal Efficiency of Permethrin (PER) and Piperonyl Butoxide (PBO) from Hand Surfaces Using DSS and Isopropyl Alcohol Dressing Sponges"*

MEMORANDUM

Versar inc.

DATE: March 30, 2004

SUBJECT: Review of "*Determination of Removal Efficiency of Permethrin (PER) and Piperonyl Butoxide (PBO) from Hand Surfaces Using DSS and Isopropyl Alcohol Dressing Sponges*" (Project #: 01-032-PY01)

This report reviews a study entitled *"Determination of Removal Efficiency of Permethrin (PER) and Piperonyl Butoxide (PBO) from Hand Surfaces Using DSS and Isopropyl Alcohol Dressing Sponges.*" The protocol provided with the study along with OPPTS Series 875 Part B, Guideline 875.2300: Indoor Surface Residue Dissipation, Postapplication and Part C Guidelines were used to review the study.

Reviewers: Laura Guziak/Linda Phillips **Date: March 30, 2004**

STUDY TYPE: Active Transfer; Hand

TEST MATERIAL: The test substance was a pre-fill batch formulation similar to that for an indoor fogger formulation developed by the McLaughlin Gormley King Company (MGK) containing the active ingredients: Permethrin (0.78% wt/wt) and Piperonyl Butoxide (.76% wt/wt).

SYNONYMS: Permethrin = PER
Piperonyl Butoxide = PBO

CITATION:

Authors	Sami Selim, Ph.D.
Study Director:	Sami Selim, Ph.D.
Title:	*Determination of Removal Efficiency of Permethrin (PER) and Piperonyl Butoxide (PBO) from Hand Surfaces Using DSS and Isopropyl Alcohol Dressing Sponges*
Report Date:	October 1, 2003
Testing Facility:	Toxcon Health Sciences Research Centre, Inc. 9607 - 41 Avenue Edmonton, Alberta Canada T6E 5X7
Analytical Facility:	EN-CAS Analytical Laboratories 2359 Farrington Point Drive Winston-Salem, NC 27107 EN-CAS Project No.: 02-0015

SPONSOR: Non-Dietary Exposure Task Force

EXECUTIVE SUMMARY:

This report reviews *Determination of Removal Efficiency of Permethrin (PER) and Piperonyl Butoxide (PBO) from Hand Surfaces Using DSS and Isopropyl Alcohol Dressing Sponges*"submitted by the Non-Dietary Exposure Task Force. The purpose of the study was to determine the total amount of PER and PBO residues that can be removed from the hand surface with simulated saliva following a single application of a known amount of a pre-fill batch fogger formulation containing 0.783% and 0.760% PER and PBO, respectively.

Five male and female subjects participated in the study. The formulation was diluted with isopropyl alcohol to a concentration of 1.88 µg, 17.6 µg, and 53.2 µg of PBO per 25 µL or 35 µL of isopropyl alcohol. One concentration of the formulation in IPA was applied directly to the washed hands of the test subjects and allowed to dry for 30 minutes at each application time. Following the drying time, the hands of the subjects were then wiped with two dressing sponges wetted with dioctyl sodium sulfosuccinate (DSS) and two dressing sponges wetted with isopropyl alcohol (IPA).

The total amount of residues removed from the hands by DSS and IPA were calculated by the study author for each hand of the test subjects. At the lowest fortification of applied product, DSS sponges removed an average of 40 ± 8.5% of the applied PER, and an average of 40 ± 5.4% of the applied PBO. At the intermediate fortification, the DSS sponges removed an average of 37.4 ± 9.4% of the applied PER, and an average of 41.0 ± 8.0% of the applied PBO. At the highest fortification, the DSS sponges removed an average of 37 ± 14% of the applied PER, and 36.8 ± 12% of the applied PBO. For the IPA sponges, at the lowest fortification of applied product, an average of 56.7 ± 9.3% of the applied PER and 41.9 ± 6.5% of the applied PBO was removed. At the intermediate fortification, an average of 50.3 ± 8.0% of the applied PER and 46.6 ± 6.7% of the applied PBO was removed. At the highest fortification, an average of 56.5 ± 8.6% of the applied PER and 50 ± 8.4% of the applied PBO was removed. For all fortifications, an average of 93% of the PER and 86% of the PBO was removed.

The protocol provided with the study along with OPPTS Series 875 Part B, Guideline 875.2300: Indoor Surface Residue Dissipation, Postapplication and Part C Guidelines were used to review the study. Overall, the majority of the procedures performed and the quality of the data generated in this study conformed to the criteria set forth in the protocol and guidelines. However, certain issues of concern were noted:

I. The test product was not identified and no product label was provided.

II. The study author calculated residues based on the amount removed from the hand by the dressing sponges. The size of the test subjects' hands were not reported to determine the amount removed per unit surface area.

III. The overall mean, standard deviation, and % CV were not reported for the field fortification recoveries.

COMPLIANCE:
Signed and dated GLP, Data Confidentiality, and Quality Assurance statements were provided. The study was performed according to the U.S. EPA FIFRA Good Laboratory Practice Regulations currently in effect (40 CFR, Part 160), with the exception of the entry and correction of information recorded on subject entry, exit, and hand inspection forms.

GUIDELINE OR PROTOCOL FOLLOWED:
The study was conducted following EN-CAS and Toxcon Standard Operating Procedures and the protocol of the Non-Dietary Exposure Task Force (Toxcon Protocol No. 01-032-PY01).

I. MATERIALS AND METHODS

A. Materials:

1. Test Material:

Formulation: An unidentified pre-fill batch fogger formulation similar to that for an indoor fogger, developed by McLaughlin Gormley King Company (MGK); contains PER (0.783 %) and PBO (0.760%) as the active ingredients.
Lot/Batch # formulation: 0204-4
Formulation guarantee: Certificate of Analysis provided.
CAS #(s): Permethrin: 52645-53-1; Piperonyl butoxide: 51-03-6
Other Relevant Information: Toxcon ID No.: PY01T009

2. Relevance of Test Material to Proposed Formulation(s): PER and PBO are active ingredients used in formulated consumer products intended for use in residential buildings. The product used was a pre-fill batch formulation similar to that of an indoor fogger formulation developed by McLaughlin Gormley King Company (MGK). The name and label for the test product was not provided with the study.

B. Study Design: There were two amendments and two deviations to the study protocol. In the first amendment, a typographical error was noted. The permethrin reference substance was incorrectly identified as Lot # 15363. The correct Lot # is 15365. The second amendment states that there was a change of responsibilities in which the sponsor representative and submitter for the Non-Dietary Exposure Task Force was changed to David J. Carlson, Technical Director, effective December 5, 2002. In the first deviation to the protocol, the DSS solution was not prepared using a precalibrated bottle as deionized water was added using a 1000 ml (±5%) pyrex beaker to make up the solution. In the second deviation, the DSS solution was mixed for an extra 55 minutes by a magnetic stirrer as this additional time was needed for the dioctyl sodium sulfosuccinate to completely go into solution.

1. Site Description:

Test locations: Not applicable to the study. The test product was applied directly to the hands of five test subjects.

Meteorological Data: Not reported.

Ventilation/Air-Filtration:Not reported.

2. Surface(s) Monitored:

Room(s) Monitored: Not applicable to this study.

Room Size(s): Not applicable to this study.

Types of Surface(s): Hand surfaces (palms) of five male and female test subjects.

Surface Characteristics: The subject's hands were washed with liquid Ivory soap, rinsed with tap water, and dried with a paper towel approximately 5 minutes before application of the formulated product.

Areas sprayed and sampled: The diluted formulated product was applied directly to the palms

of the washed hands of the test subjects. The hands were sampled with dressing sponges to determine the amount of compound that could potentially be transferred from the hand to the mouth.

Other products used: None

3. Physical State of Formulation as Applied : Liquid

4. Application Rates and Regimes:

Application Equipment: The diluted formulation was pipetted directly to the hands using a 25 µL or a combination of 25 µL and 10 µL Wiretrol micropipettes.

Application Regime: One 25 µL or one 25 µL and 10 µL application of the diluted product was applied to the washed palms of ten hands per concentration and allowed to dry for 30 minutes.

Application rate(s): The formulation was diluted with isopropyl alcohol to a concentration of 1.88 µg, 17.6 µg, and 53.2 µg of PBO per 25 µL or 35 µL of isopropyl alcohol. One concentration of the formulation was applied at each application time.

Equipment Calibration Procedures: Not applicable to this study.

Was total deposition measured? Not applicable to this study.

D. Sampling:

Surface Areas Sampled: The palms of five male and female subjects were sampled; however, the surface area measurements of their hands were not reported.

Replicates per sampling interval: Both hands of the five test subjects were sampled (10 total replicates).

Number of sampling intervals: There were three sampling intervals that occurred approximately 30 minutes after each concentration of the the test substance was applied to the hands. The hand wiping procedure was repeated for each of the test substance concentrations at least one day after the previous application.

Method and Equipment: The hand wipes were conducted using four 4" x 4" 6-ply dressing sponges.

Sampling Procedure(s):

Deposition coupons - Not applicable to this study.

Hand residues- The removal of the test substance was conducted 30 minutes following application of the test substance. Five test subjects (ten hands) were used. The hand wipe consisted of wiping the palm of the hand with 4" x 4" 6-ply dressing sponges. About 5 mL of either DSS or IPA was added to each dressing sponge prior to use. The palm of each hand was first wiped with two dressing sponges that had been wetted with DSS and then with two dressing sponges wetted with IPA. Four dressing sponges were used per hand.

3. Sample Handling and Storage:

The dressing sponges were placed in separate pre-labeled 180mL amber glass jars with teflon-lined lids and stored in the dark at less than -10 C until being shipped to the analytical laboratory. Sample storage and shipment was conducted according to Toxcon Nos. G-022 *Storage of Test Samples and Analytical Extracts* and G-028 *Test Sample Distribution to a Contract Laboratory*. Samples were shipped to the analytical laboratory by airfreight with priority overnight delivery. Samples were shipped in an insulated cooler with dry ice.

IV. ANALYTICAL METHODOLOGIES

A. Extraction method:

Dressing sponges: Residues were extracted once from the dressing sponges by mechanical shaking for 30 minutes with 70/30 hexanes/acetone. Evaporative concentration of field and laboratory controls as well as LOQ fortifications was required. An additional clean-up procedure was required for dressing sponges when PER residue levels were approximately 2 ug or less.

B. Detection methods: PER was analyzed by a gas chromatograph equipped with a DB-5 column using an electron capture detector (GC/ECD). A 1-ml aliquot of the final extract was transferred to an autoinjector vial containing dimethyldichlorosilane (DMDCS) which was added to help compensate for matrix effects during instrumental analysis.

PBO was analyzed by high performance liquid chromatography using a fluorescence detector (HPLC/FD). The extracts were solvent exchanged into acetronitrile and injected into the HPLC/FD system. The column switching consisted of a Zorbax phenyl pre-column programmed to transfer only the pre-column eluent in the PBO retention time region (approximately 1 minute window) to the Zorbax SB C18 analytical column. A 60:40 acetonitrile:water mixture was used in the pre-column, while an 80:20acetonitrile:water mixture was used in the C18 analytical column. The fluorescence excitation and emission wavelengths monitored were 288 nm and 345 nm, respectively.

No further details regarding the GC/ECD or HPLC/FD conditions were provided. According to the Analytical Phase Report provided in the Study Report, EN-CAS, Analytical Method No. ENC-2/01, Rev 1, entitled *Analytical Method for the*

D. Method Validation:

The analytical methods were validated by EN-CAS prior to the analysis of any samples. According to the Analytical Phase Report in the study, the results are reported in EN-CAS Project No. 01-0038, entitled *Permethrin and Piperonyl Butoxide (PBO)Validation Study: The Determination of PER and PBO in/on 2=Propanol (IPA) Moistened Dressing Sponges*. The LOQs provided in the Study Report are shown in Table 1.

Table 1. Validated LOQs

Matrix	LOQ (µg)	
	PER	PBO
Dressing Sponge	0.200	0.173

Instrument performance and calibration: Stock solutions of 1000-µg/mL were prepared for PER and PBO by weighing 100 mg of each reference material (corrected for purity) into long necked 100-110 mL volumetric flasks. Both solutions were then brought to volume with hexanes. Serial dilution of these solutions with 70:30 hexanes:acetone resulted in PER and PBO calibration standards with the following concentrations: 0.005, 0.01, 0.02, 0.05, and 0.10 µg/mL.

E. Quality Control:

Lab Recovery: To obtain recovery and method performance data, concurrent laboratory control dressing sponge samples were fortified with permethrin and piperonyl butoxide. Four sets of samples were fortified, one set at the LOQ, one at 10x the LOQ, one at 100x the LOQ, and one at 300x the LOQ. Versar verified the results from the laboratory fortified samples these are summarized in Table 3. The average recovery of the low level spike for PER was 100.3% versus 105.4% at the high level. The average recovery of the low level spike for PBO was 89.8% versus 94.0% at the high level. Overall average recoveries were 100.8 ± 13.5% for PER and 92.0 ± 5.19% for PBO.

Table 3. Summary of Concurrent Laboratory Fortification Recoveries

Matrix	N	Average Fortification Level (µg)		Average Measured Residue (µg)		Average Percent Recovery (%)		Overall General Recovery (%)		Overall Std. Dev.		Overall % CV	
		PER	PBO	PER	PBO	PER	PBO	PER	PBO	PER	PBO	PER	PBO
Dressing Sponges	~1 x LOQ							100.8	92.0	13.5	5.2	13.4	5.6
	6	0.209	0.188	0.21	0.168	100	89.8						
	~10 x LOQ												
	2	2.09	1.88	1.97	1.75	94.3	93.1						
	~100 x LOQ												
	2	20.9	18.8	21.8	18	104	95.7						
	~300 x LOQ												
	2	62.8	56.3	66.2	52.9	105	94						

Field Fortification: One set of triplicate field fortification samples was prepared for the IPA dressing sponges at high and low fortification levels that were near the levels applied to the hands. Diluted formulated product was pipetted directly to a triplicate set of two dressing sponges that had been wetted with 5 mL isopropyl alcohol to yield an amount of 2.41, 19.3, and 53.5 µg PBO per each set of dressing sponges. These samples were stored frozen prior to shipment to the analytical laboratory. Field fortification results are summarized in Table 4. Overall average recoveries were 93.9 ± 4.09% for PYI and 93.9 ± 4.04% for PBO.

Table 4. Summary of Field Fortification Recoveries for IPA Dressing Sponges

Matrix	N	Average Fortification Level (µg)		Average Measured Residue (µg)		Average Percent Recovery (%)		Overall Average Recovery (%)		Overall Std Dev.		Overall % CV	
		PER	PBO	PER	PBO	PER	PBO	PER	PBO	PER	PBO	PER	PBO
Dressing Sponge	~15 x LOQ							93.9	93.9	4.09	4.04	4.36	4.3
	3	2.93	2.41	2.67	2.34	91.2	97.4						
	~117 x LOQ												
	3	23.4	19.3	21.7	17.7	93	91.7						
	~325 x LOQ												
	3	65	53.5	63.4	49.6	97.5	92.6						

Control Samples: Six laboratory control blanks and four field blanks were analyzed. All concurrent laboratory control samples for the dressing sponges had no detectable residue levels of PER or PBO.

Storage Stability: Control dressing sponges were received at ambient temperature while study samples were received in frozen condition. The control samples were held at ambient temperature at EN-CAS. The study samples were placed in a laboratory freezer where they remained frozen until they were thawed for analysis. Freezer storage temperatures were monitored on a daily basis and were -10 C.

V. RESULTS

A. Alpha Cellulose and Deposition of Formulation:

Not applicable to this study.

B. Hand Residues

The total amount of residues removed from the hands by DSS and IPA were calculated by the study author for each hand of the test subjects at each of the three fortifications. Residues were reported for PER and PBO. Versar did not have to correct the data, as all field fortification recoveries were > 90%.

On the DSS wipes at the lowest fortification of 2.26 µg PER and 1.88 µg PBO, 27% to 50% of the applied PER was removed, and 34% to 50% of the applied PBO was removed. The mean PER removed at this fortification from the DSS wipes was 40 ± 8.5%. The mean PBO removed at this fortification from the DSS wipes was 41 ± 5.4%. The IPA wipes removed an additional 46% to 76% of the applied PER, and an additional 32% to 51% of the applied PBO. The mean PER removed at this fortification from the IPA wipes was 56.7 ± 9.3%. The mean PBO removed at this fortification from the IPA wipes was 41.9 ± 6.5%. The total amount of compound removed at this fortification from both the DSS and IPA wipes was 97% PER and 83% PBO.

On the DSS wipes at the intermediate fortification of 22.0 µg PER and 17.6 µg PBO, 25% to 50% of the applied PER was removed, and 30% to 56% of the applied PBO was removed. The mean PER removed at this fortification from the DSS wipes was 37.4 ± 9.4%. The mean PBO removed at this fortification from the DSS wipes was 41.0 ± 8.0%. The IPA wipes removed an additional 38% to 60% of the applied PER, and an additional 36% to 55% of the applied PBO. The mean PER removed at this fortification from the IPA wipes was 50.3 ± 8.0%. The mean PBO removed at this fortification from the IPA wipes was 46.6 ± 6.7%. The total amount of compound removed at this fortification from both the DSS and IPA wipes was 88% PER and 88% PBO.

On the DSS wipes at the high fortification of 63.1 µg PER and 53.2 µg PBO, 19% to 59% of the applied PER was removed, and 19% to 51% of the applied PBO was removed. The mean PER removed at this fortification from the DSS wipes was 37 ± 14%. The mean PBO removed at this fortification from the DSS wipes was 36.8 ± 12%. The IPA wipes removed an additional 46% to 70% of the applied PER, and an additional 39% to 64% of the applied PBO. The mean PER removed at this fortification from the IPA wipes was 56.5 ± 8.6%. The mean PBO removed at this fortification from the IPA wipes was 50 ± 8.4%. The total amount of compound removed at this fortification from both the DSS and IPA wipes was 94% PER and 87% PBO.

VI. CONCLUSION

Samples analyzed in this study were used to measure the removal by DSS and IPA sponges of PER and PBO from bare hands to which known amounts of formulated product were applied. At the lowest fortification of applied product, DSS sponges removed an average of 40 ± 8.5% of the applied PER, and an average of 40 ± 5.4% of the applied PBO. At the intermediate fortification, the DSS sponges removed an average of 37.4 ± 9.4% of the applied PER, and an average of 41 ± 8.0% of the applied PBO. At the highest fortification, the DSS sponges removed an average of 37 ± 14% of the applied PER, and 36.8 ± 12% of the applied PBO. For the IPA sponges, at the lowest fortification of applied product, an average of 56.7 ± 9.3% of the applied PER and 41.9 ± 6.5% of the applied PBO was removed. At the intermediate fortification, an average of 50.3 ± 8.0% of the applied PER and 46.6 ± 6.7% of the applied PBO was removed. At the highest fortifications, an average of 56.5 ± 8.6% of the applied PER and 50± 8.4% of the applied PBO was removed. At all fortifications, an average of 93% of the PER and 86% of the PBO was removed.

LIMITATIONS OF THE STUDY:

The protocol provided with the study along with OPPTS Series 875 Part B, Guideline 875.2300: Indoor Surface Residue Dissipation, Postapplication and Part C Guidelines were used to review the study. Overall, the majority of the procedures performed and the quality of the data generated in this study conformed to the criteria set forth in the protocol and guidelines.

IV. The test product was not identified and no product label was provided.

V. The study author calculated residues based on the amount removed from the hand by the dressing sponges. The size of the test subjects' hands were not reported to determine the amount removed per unit surface area.

VI. The overall mean, standard deviation, and % CV were not reported for the field fortification recoveries**.**

Table 5. Summary of IPA and DSS Dressing Sponge Results from Hand Sampling

Replicate	Amount Applied to Hand (µg)		µg Found				Average µg Found				Average Standard Deviation				Average Summed µg Found		Average Percent Removed (%)		Standard Deviation Percent Removed (%)	
	PER	PBO	IPA Sponges		DSS Sponges		IPA Sponges		DSS Sponges		IPA Sponges		DSS Sponges		PER	PBO	PER	PBO	PER	PBO
	PER	PBO	PER	PBO	PER	PBO	PER	PBO	PER	PBO	PER	PBO	PER	PBO	□	□	□	□	□	□
12LI	2.26	1.88	1.20	0.71	1.06	0.85	1.28	0.79	0.91	0.77	0.21	0.12	0.2	0.1	2.19	1.55	96.9	82.6	4.3	3.28
12RI			1.15	0.71	0.86	0.76														
22LI			1.73	0.95	0.62	0.64														
22RI			1.51	0.89	0.62	0.74														
32LI			1.32	0.67	0.89	0.78														
32RI			1.05	0.61	1.13	0.94														
42LI			1.26	0.95	1.02	0.69														
42RI			1.09	0.70	1.12	0.89														
52LI			1.37	0.88	0.75	0.65														
52RI			1.14	0.80	1.00	0.74														
120LI	22.0	17.6	11.8	8.89	6.73	6.23	11.1	8 21	8.22	7 21	1.8	1.2	2.1	1.4	19.3	15.4	87.6	87.6	2.5	2.80
120RI			8.40	6.30	11.0	9.82														
220LI			9.85	7.38	10.0	7.96														
220RI			10.9	8.21	8.9	7.09														
320LI			12.6	9.08	7.39	7.17														
320RI			12.2	8.33	6.9	7.17														
420LI			10.3	8.31	9.36	7.41														
420RI			8.44	6.44	10.8	8.64														
520LI			13.1	9.43	5.59	5.24														

520RI	22.0	17.6	13.0	9.73	5.52	5.35	11.1	8.21	8.22	7.21	1.8	1 2	2 1	1.4	19.3	15.4	87.6	87.6	2 5	2.80
160LI			31.8	25.7	29.9	23.7														
160RI			29.1	21.5	30.7	23.2														
260LI			39.4	29.8	15.2	13.9														
260RI			44.0	33.9	12.0	10.1														
360LI			37.9	27.0	20.4	20.2														
360RI	63.1	53.2	30.8	20.6	27.7	25.8	35.6	26.7	23.5	19.6	5.4	4.5	8.7	6.3	59.2	46.3	93.8	86.7	6.2	5.0
460LI			29.4	22.9	37.1	27.1														
460RI			32.8	24.2	31.1	25.3														
560LI			41.5	31.4	15.9	13.4														
560RI			39.6	29.8	15.3	13.1														